LPR 3011-RS READER

USER MANUAL

DOCUMENT REFERENCE: LPR3011RS-UM-1.3-EN

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1 FOREWORD

1.1 PURPOSE OF THIS MANUAL

This manual presents the BALOGH HYPER X reader LPR3011-RS.

It describes how to install and how to use it.

Further information pertaining to the data interfaces described in this manual can be found in the Interface Manual (reference LPR3011-IM-x.y-EN).

1.2 DOCUMENT NAMING CONVENTIONS

The coding used for a manual name is:

<device name>- UM-II-L

in which:

UM signifies User Manual

II refers to the issue or version number

L refers to the language of the manual

1.3 DOCUMENT STATUS SHEET

Version	Date	Description of changes
1.0	11/02/2008	Creation
1.1	15/02/2008	Update and complement of information
1.2	28/03/2010	Correction on parameter table
1.3	29/03/2012	Update and complement of information

1.4 NOTE

The contents of this manual are subject to changes without notice.
BALOGH cannot be held responsible for the consequences of any error, omission, or incorrect interpretation of the information provided.

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2 DESCRIPTION OF READER

2.1 GENERAL DESCRIPTION

LPR3011 readers will identify HyperX™ tags on the fly at distances of up to 2m.
The reader is a compact all-in-one device. The weatherproof housing of sober design contains all the functional elements of the reading unit: Antennas, Microwave generator, receiver, CPU and communication interface.

The reader can be mounted directly onto any panel, even a metallic one.

The main characteristics are as follows:

- Dimensions : 174x108x29mm
- Weight: 0.7 Kg
- Cover Color: Grey RAL 7035
- IP65 protection
- Power requirements: between +12Vdc and +24Vdc, current 1A max.
- Operating temperature: from -20C° up to +50C°

2.2 WARNINGS

The badges intended to use with the long range readers may be deprogrammed or damaged when using mobile phones in direct vicinity.
A clearance distance between the badges and mobile phones must be at least 10 cm.

The installation of the long range reader may only be carried out in places that fulfil climatic and technical conditions stated by the manufacturer.
BALOGH is not liable for damages resulting from improper handling or incorrect installation.

All reconstructions or technological changes result in complete exclusion of liability.

2.3 OPERATING PRINCIPLE

Electromagnetic radiation in the frequency range 1 to 100 GHz is called microwaves.
Their physical characteristics allow high data rates and good directivity.
Reading antennas are smaller and performance is relatively independent of the environment.

Tags are not active when not in the reader's antenna zone.

The tag's originality (patented) is its capacity to reflect the microwaves emitted by the readers. A tag receiving an incident unmodulated 2.45 GHz carrier, will reflect this wave but modulated by its own identification code.

The reader receives and processes this signal and then converts and sends the data to a host system over a standardized connection.

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2.4 COMMUNICATION INTERFACES

This reader can be used in place of most conventional models, both contact and contact-less.

Communication with a "host" system takes place using the following standardized links:

- Open-collector: DATA/CLOCK, WIEGAND 26bits
- Serial asynchronous: RS232, RS422 or RS485

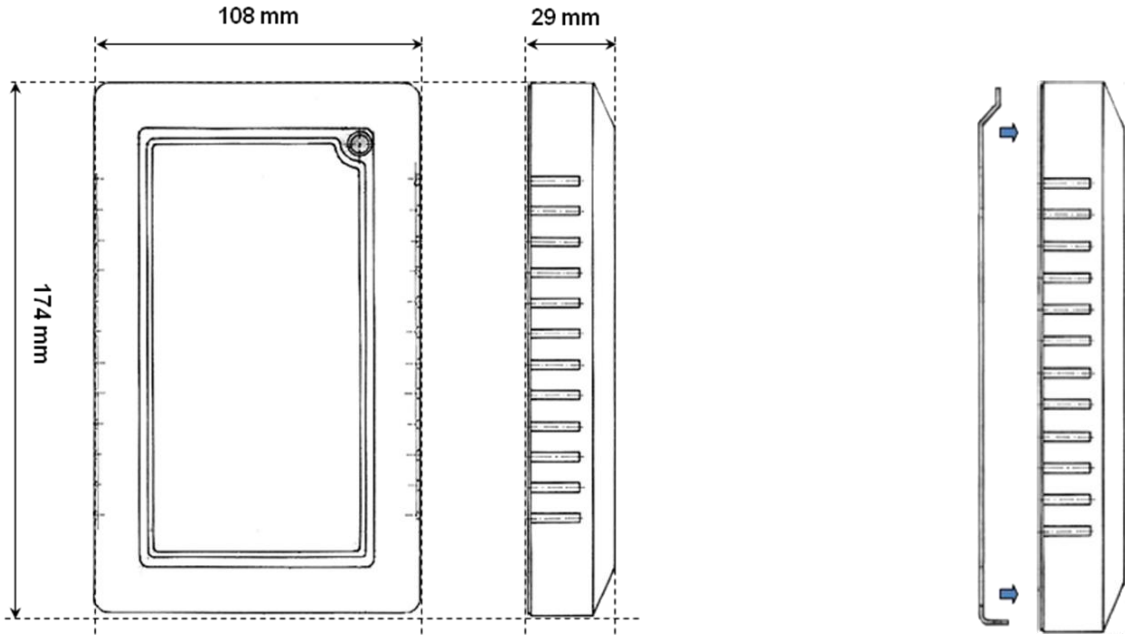
For the RS links, full two-way communication is possible using the MODBUS™ protocol.
Note: all the interfaces are not available simultaneously.

These readers are also equipped with:

- An opto-coupled digital output that can be configured to switch either via a command sent from the host or automatically at each tag identification.
- An opto-coupled digital input which can be used to globally enable or disable tag reading.

The readers must be powered with 12 - 24 VDC. A special detector ensures that if the input voltage is too low then the reader will not power up. Powering the reader from a mains outlet requires an AC adaptor of at least 10W.

2.5 OVERALL DIMENSIONS



3 INSTALLING THE LPR READER

This reader includes a removable mounting plate on its back.
This plate is provided with 4x slots Ø6mm x 10mm for attaching the reader on a flat surface, or on any support made on request (screwed on a drilled metallic profiles for example).

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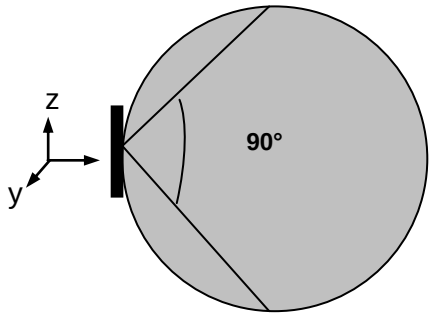
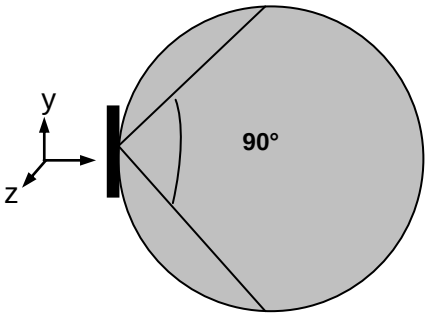
3.1 POSITIONING OF READER

The directivity of the reader's antenna is a symmetrical 90° x 90°.
Mounting the reader horizontally or vertically does not affect its performance.



Side view



Top view

Position the reader so that it points to the zone where the tags are likely to be. Maximum performance is always achieved with the line of sight perpendicular to the face of the reader.

With a bracket the reader can be pivoted. The orientation can be freely adjusted. Pivoting can be either horizontal (side to side) or vertical (up and down).

When positioning the reader, the following recommendations should be followed:

Avoid placing the reader in direct sunlight, where overheating may cause the internal electronics to reach temperatures above those recommended for normal operation.
If this is not possible then a sun-shield should be mounted.

When two or more readers are situated in the same zone, make sure they are not pointing towards each other.
If necessary, their pointing axes should be slightly redirected.
The frequency channels should be as far apart as possible. A separation of 0.750 MHz is recommended for readers situated close together (see the frequency table at the end of the manual).

Do not install a reader close to a source of potential interference in order not to degrade its performance.

The indicated reading distance is a nominal value and the actual range is usually greater. However there are several sources of interference present in the environment which may affect reader performance and which must be taken into account. Quite often this interference cannot be removed and results in a reduced reading range.

The main sources of interference are:

- Devices operating in the same band of frequencies, such as wireless communications (WLAN),
- Mobile phones and smartphones,
- Microwave ovens,
- Fluorescent lighting,
- Metal objects such as gratings, fences or heat-reflective vehicle windscreens,

Etc.

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4 CONNEXION OF READER LPR 3011-RS

HYPER.X™ reader LPR 3011-RS series are mono block readers inside a waterproof casing adapted for outdoor installation.
They come in the form of a rectangular casing with light indicator at the front and 2 cables at the the bottom.

TTL cable RS cable

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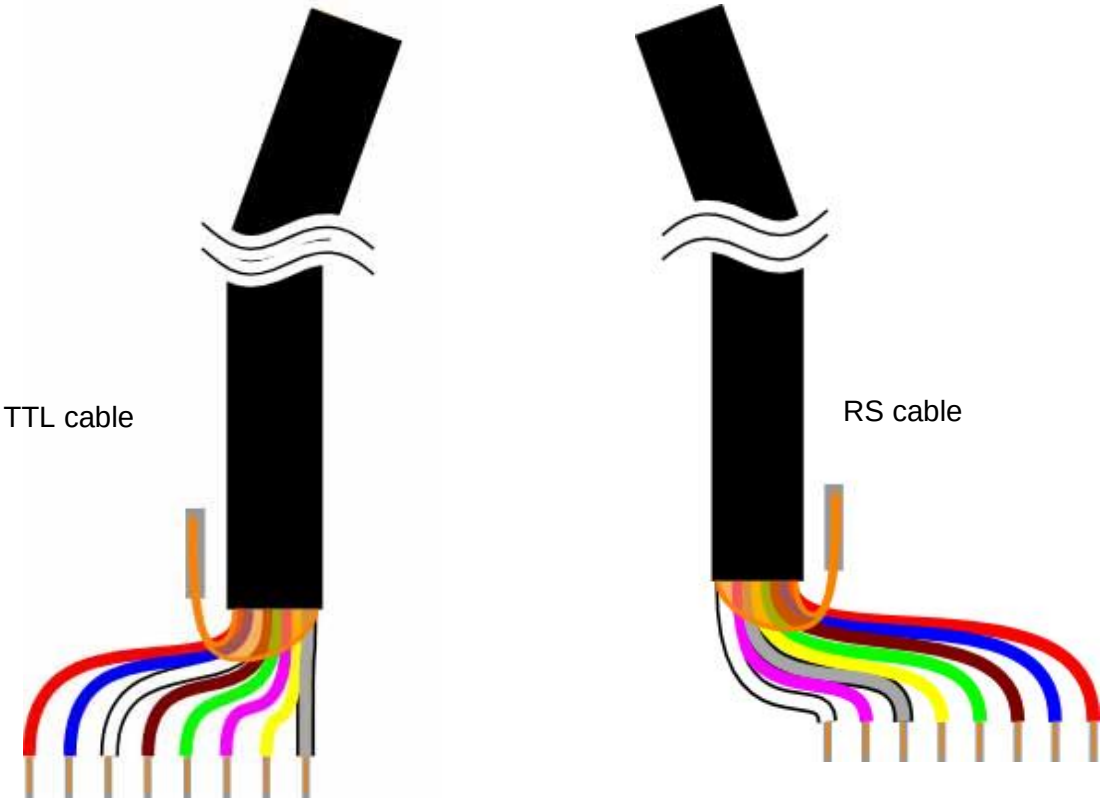

Colour		TTL cable	RS cable		
			RS-232	RS-422	RS-485
	Red	Vpower – reader's "+" power supply	Not connected		
	Blue	GND – reader's "-" power supply	GND		
	White	STROBE (ISO2) / Data 1 (WIEGAND)	E1 GND – reference for digital input		
	Brown	MDATA (ISO2) / Data 0 (WIEGAND)	TX	TX+	+V
	Green	PRES_BADGE (ISO2)	-	TX-	-V
	Pink	VI – Supply for digital output	EI – digital input		
	Yellow	SIC – Output collector	-	RX+	-
	Grey	SIE – Output emitter	Rx	RX-	-
	Braided	Braided - GND	Braided - GND		

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4.1 POWER SUPPLY

The reader can be powered with 12Vdc to 24Vdc.
The power consumption is 5W typical, 12W maximum.

4.2 OPERATION OF THE INDICATOR LIGHT

The indicator light on the reader conveys the reader's behaviour to the user. It is the only visible part of the system. It is controlled by the embedded reader software. It can also be put under host control using appropriate MODBUS commands via a serial link.

During the initialization phase, the light is a fixed red. If the initialization is successful, the indicator light starts to flash green, otherwise it flashes red very slowly.

If after power-on the light flashes quickly, this is usually caused by a power supply problem, either voltage or current insufficient. This is not a fault condition, but an indication that a better-dimensioned power supply must be used..

During the reading of a tag, the indicator light goes out for one second, then resumes green flashing.

When reading a tag with a low battery, the indicator light flashes red briefly before going out for one second, then it resumes green flashing.

4.3 TTL CABLE

4.3.1 POWER SUPPLY

Colour	Name	description
red	Vpower	Reader's + power supply
blue	GND	Reader's – power supply
braided	GND	Ground

The power supply to the reader must be between +12VDC and +24VDC with a maximum power of 5W.

4.3.2 OPEN-COLLECTOR CONNECTION

The wires convey different signals, depending on the type of interface selected.

Colour	ISO2	WIEGAND
white	STROBE	DATA "1"
brown	MDATA	DATA "0"
green	PRES_BADGE	—
blue	GND	GND

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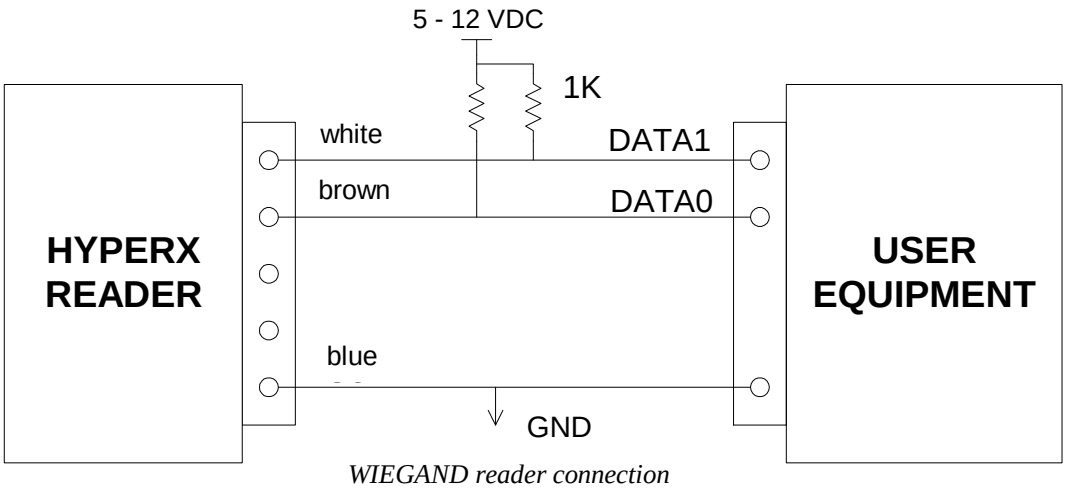
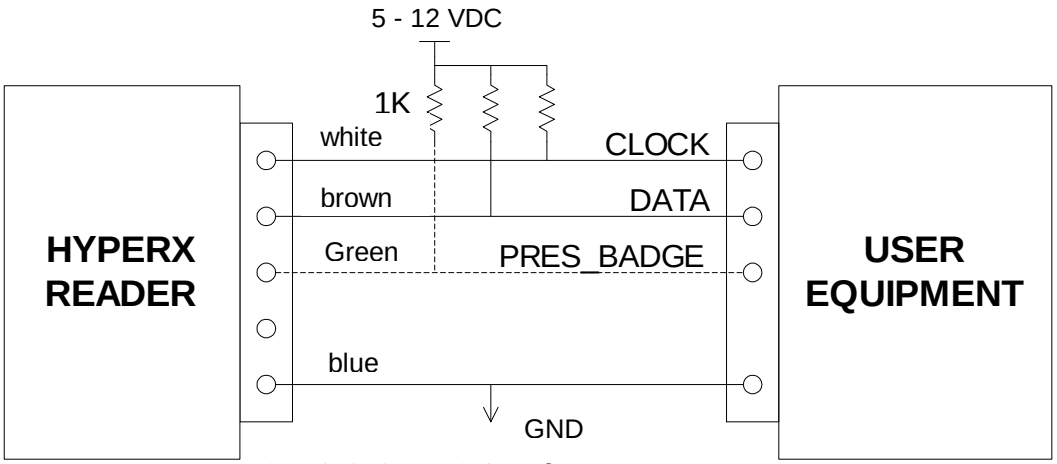
The figures below show external ISO2 and WIEGAND connections



WIEGAND reader connection



ISO2 (DATA/CLOCK) reader connection

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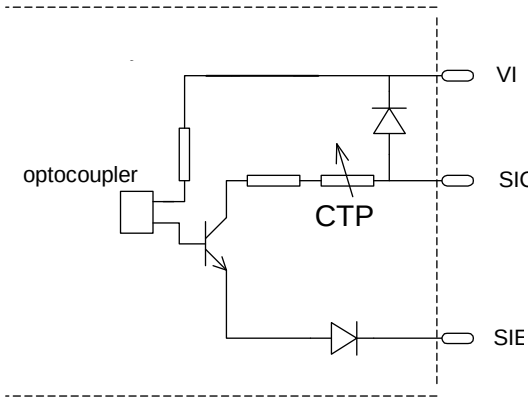
4.3.3 DIGITAL OUTPUT

The digital output is galvanically isolated from the reader by means of an optocoupler.



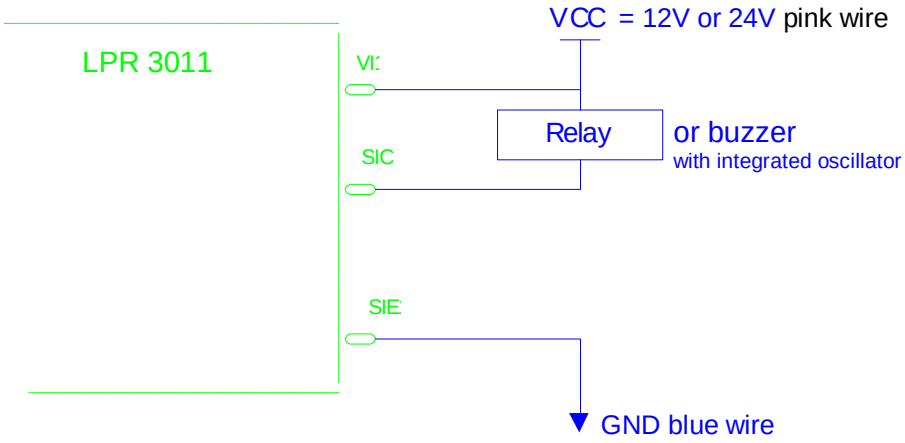
Circuit diagram of digital output

The writing of a logic "0" and the application of an external voltage (of between 5V and 24V) applied to terminal VI turns the transistor ON. The load is connected between SIC and VI. The collector current that can circulate will produce a voltage of around 1V on this pin.

If on the contrary a logic "1" is written, then the transistor is turned OFF and the voltage at the SIC pin will be the same as that on VI.
The output is capable of controlling a 12V or 24V relay. It can supply a current of around 100mA.

Colour	nom	description
pink	VI	Output supply
yellow	SIC	Output collector
grey	SIE	Output transmitter

EXAMPLE OF CONNECTING A BUZZER OR RELAY:



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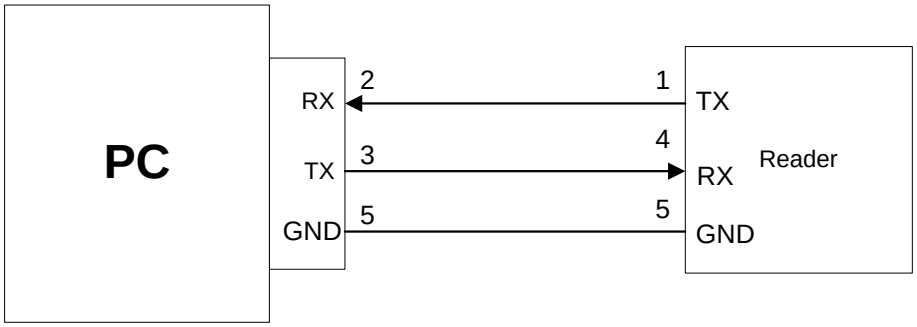
4.4 RS CABLE

4.4.1 ASYNCHRONOUS LINK

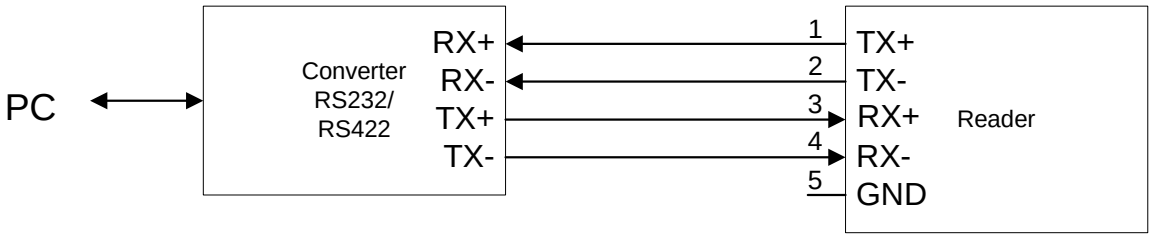
The wires carry different signals, depending on the type of interface configured.

Colour	Pin	RS-232	RS-422	RS-485
Brown	1	TX	TX+	+ V
green	2	—	TX-	- V
yellow	3	—	RX+	—
grey	4	RX	RX-	—
blue	5	GND	GND	GND
braid	-	GND	GND	GND

The figures below show external RS-232, RS-422 and RS-485 connections.



RS-232 reader connection



RS-422 reader connection

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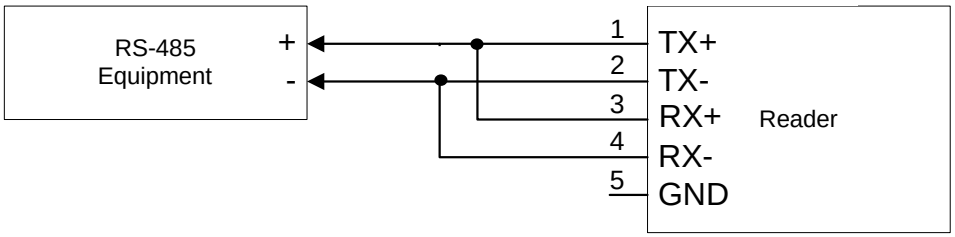

RS-485 reader connection

- **LINE TERMINATION**

For a simplex link, the termination (if present) should be placed at the receiving end of the line.

For a duplex link, the termination (if present) should be placed at the each end of the line.

For baud rates less than 1200 bauds, no termination is necessary. For baud rates greater than 9600 bauds and line lengths greater than 1000 metres, a resistor equal to the line impedance (120 ohms) is usually necessary. For cases in-between, there is no clear-cut rule and depends on individual installations (combination of baud-rate, line-length, cable quality, emitter/receiver characteristics).

- **ELECTRICAL CONNECTION**

For an RS-232 link , wiring up is straightforward, the TX and RX lines of both equipments are connected together.
For a differential link (RS-422 or RS-485), the polarities are not always clearly defined. Normally the "+" line is at a high level at rest and is active low. For the "-" line, the opposite is true. This is the case for the differential interface for the HYPERX readers. However if the differential signals are generated by a converter acting on RS-232 signals, then the "+" line can be at a low level at rest and active high. In this case, the "+" line of one equipment must be connected to the "-" line of the other equipment.

- **0V CONNECTION**

Whether this is necessary or not, depends on the installation. For RS-232 links, distances are necessarily short so both equipments will have the same ground potential, in which case the 0V references should be connected. For differential links, the 0V connection is not always necessary. For large link lengths, local equipment ground potentials maybe different, so a 0V connection will cause ground currents to flow. Differential links also tolerates a large common-mode voltage difference.
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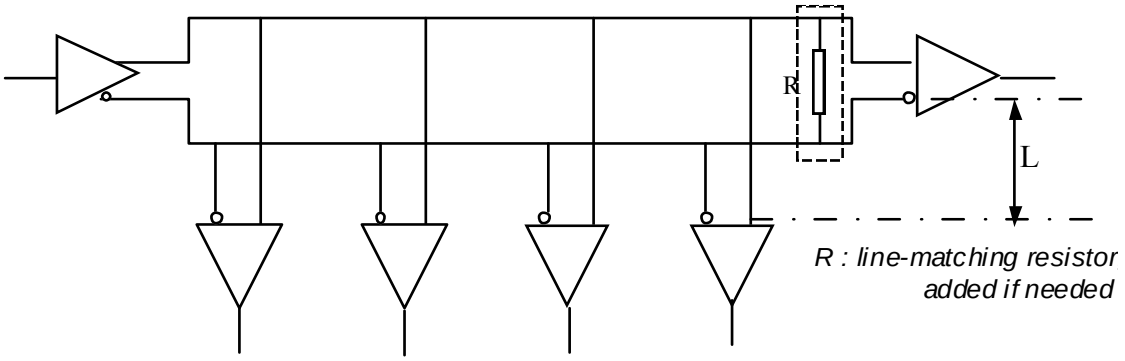
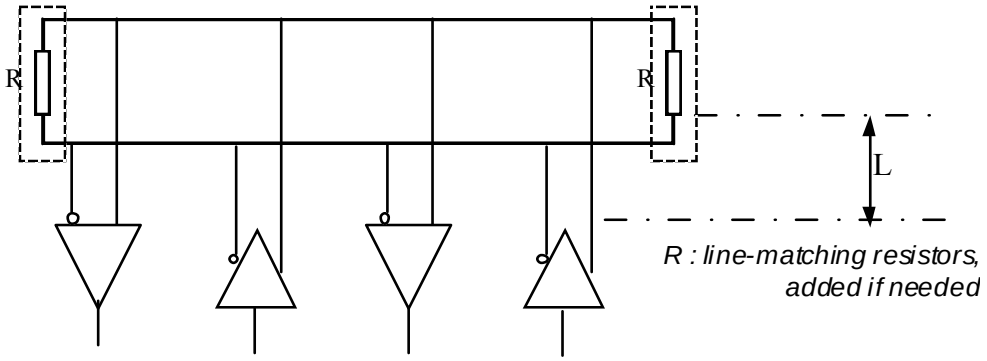
- **CONNECTION TO A NETWORK**
  - **Topology**

The preferred topology is the bus.



Networking of readers –simplex connection



Networking of readers – half-duplex connection

The length of the derivation should be as short as possible (< 30 cm).
The maximum length allowed can be calculated from the cable characteristics using the equation below.

$L < 1300 / (Z_0 \times C_L)$ L in metres, Z_O in ohms and C_L in pF/m

  - **Line biasing**

For RS-485, line biasing may prove necessary and must be done externally and only at one point on the line.

The line "+" is connected to +5V via a 4K7 resistor.
The line "-" is connected to 0V via a 4K7 resistor.

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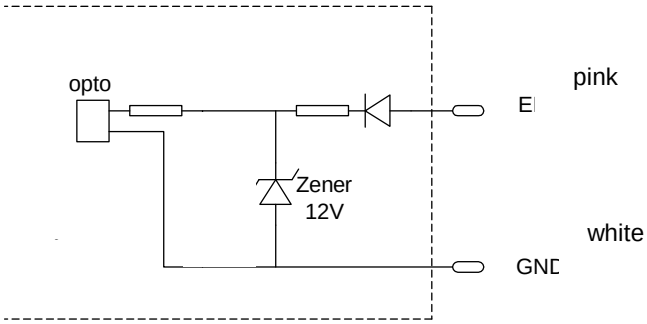
4.4.2 DIGITAL INPUT



Circuit Diagram of digital input

There is one digital input. It is galvanically isolated from the reader by means of an optocoupler.

An open contact or positive voltage of less than 5 V applied to pin EI will produce an internal logic status of “1”, the bit E1 of the status word is 1.

A voltage of between 5V and 24V will produce an internal status of "0", the bit E1 of the status word is 0. The voltage applied must not exceed 24V in normal circumstances.

This input is read and updated by the software every 10ms.

This input can enable or disable the reading of tags, for example if the input is controlled by a ground loop detector circuit.

➔ Input 1 is active-high (Vin > 5V).

colour	pin	name	description
pink	1	EI	Input signal
white	2	GND	Input reference

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5 READER PARAMETERS

All of the parameters in the table are saved in the non-volatile memory. The number in the second column gives the order in which they are memorised. The parameters can be modified by the user using RS link and appropriate MODBUS commands.

Parameter		Function value	Internal value	Default	Notes
reserved	1				
Channel n°	2	0 to 31	0 to 31	**0**	
Persistence	3	0.1s	0		
		0.5s	1		
		1s	2	**x**	
		2s	3		
		5s	4		
		10s	5		
reserved	4				
Issuer code filtering	5	no filtering	0	**x**	
		on 1st code	1		
		from EEPROM	2		up to 2 codes in EEPROM
Issuer code size	6	3	3	**3**	
		4	4		
indicator light	7	NORMAL	0	**x**	
		TEST	1		
message mode	8	0	0	**0**	
		1	1		reserved
		2	2		
		3	3		
function tags	9	OFF	0	**x**	Not implemented
		ON	1		
reserved	10				
RS type interface	11	RS232	0	**x**	
		RS422	1		
		RS485	2		
CO type interface	12	not used	0	**x**	
		ISO2 fixed	1		
		ISO2 var	2		
		WIEGAND	3		
		WIEGAND with preamble	4		
MODBUS address	13	1 to 31	1 to 31	**1**	
Data rate	14	9600	0	**x**	
		4800	1		
		1200	2		
		19200	3		

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Parameter		Function value	Internal value	Default	Notes
Character format	15	8 bit no parity	0	**x**	
		7 bit even parity	1		
		7 bit odd parity	2		
Frame type	16	ASCII	0	**x**	format "test" (with header)
		code only	1		ASCII without header
		reserved	2		(format TIME DESIGNA)
		MODBUS	3		
Polling/Interr	17	Interrupt	0	**x**	
		Polling	1		
MTBM	18	0.1s	0		
		0.2s	1		
		0.5s	2	**x**	
		1s	3		
		2s	4		
No. Emissions	19	1 to 4	1 to 4	**1**	no. of transmissions in interrupt mode
Digital Output	20	not used	0		
		Copy buzzer	1		
		reading 2s	2	**x**	
		host	3		
		Copy green led	4		
		tag battery low	6		
		copy red led	7		
reserved	21				
Range	22	0 to 3	0 to 3	**3**	
reserved	23				
Digital Intput	24	inactive	0	**x**	
		active	1		Tag reading validation
reserved	25				
reserved	26				
Hopping time	27	100 ms	0		
		150	1		
		200	2		
		300	3	**x**	
		400	4		
		500	5		
		800	6		
		1000	7		
Serial Interface Test	28	OFF	0	**x**	
		ON	1		

Configuration parameters

Refer to interface manual for complete description (reference LPR3011-IM-x.y-EN)

BALOGH SA, 189 rue d'Aubervilliers C.P. 97 75886 PARIS Cedex 18 FRANCE
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6 CHANNEL FREQUENCIES

Sorted by frequency	
Frequency (MHz)	**Channel number**
2446.25	31
2446.50	24
2446.75	25
2447.00	26
2447.25	27
2447.50	28
2447.75	29
2448.00	1
2448.25	2
2448.50	3
2448.75	4
2449.00	5
2449.25	6
2449.50	7
2449.75.	8
2450.00	9
2450.25	10
2450.50	11
2450.75	12
2451.00	13
2451.25	14
2451.50	15
2451.75	16
2452.00	17
2452.25	18
2452.50	19
2452.75	20
2453.00	21
2453.25	22
2453.50	23
2453.75	30

Sorted by channel number	
Channel number	**Frequency (MHz)**
1	2448.00
2	2448.25
3	2448.50
4	2448.75
5	2449.00
6	2449.25
7	2449.50
8	2449.75.
9	2450.00
10	2450.25
11	2450.50
12	2450.75
13	2451.00
14	2451.25
15	2451.50
16	2451.75
17	2452.00
18	2452.25
19	2452.50
20	2452.75
21	2453.00
22	2453.25
23	2453.50
30	2453.75
31	2446.25

Channel number 0 is used for the frequency hopping mode. In this mode, the reader operates for a certain time on one channel, then hops onto another channel, and so on. The sequence is pseudo-random and the time the reader spends on any particular channel is determined by the "Hopping period" parameter. The frequencies/channels used cover all of the available frequency band.

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7 MAINTENANCE

7.1 PERIODIC MAINTENANCE

The LPR 3011-RS reader requires no periodic maintenance

The reader should be regularly cleaned in order to avoid dust and dirt accumulating on the case.

The reader should be regularly checked for:

- cracks in the case
- Fixing screws correctly tightened
- cables correctly connected with no injuries

7.2 REPLACEMENT

If the LPR 3011-RS needs to be replaced, the procedure is as follows:

- Turn off power supply, and disconnect all cables
- Record the reader orientation (azimuth and elevation), then remove the mounting screws and dismount the unit.
- Place the new unit in the same position, insert the mounting screws and tighten correctly.
- Reconnect all cables and power up the reader.

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7.3 RECYCLING

All decommissioned readers must be returned to BALOGH SA for appropriate recycling according to directive D3E.

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8 LEGAL INFORMATION

8.1 CE NOTICE

DECLARATION OF CONFORMITY

CE 0536

BALOGH Toulouse
105 Avenue du Général Eisenhower
31023 TOULOUSE cedex 1
FRANCE

This declaration certifies that the device LPR 3011 satisfies the essential requirements of the European directive R&TTE 1999/5/EC aiming to align the laws of the Member States relating to the use of the electromagnetic spectrum, electromagnetic compatibility and electrical safety.

This declaration applies to all readers manufactured according to the technical specifications outlined in Annexe II of the directive. Evaluation of the conformity of the equipment with the essential requirements of article 3 R&TTE has been done in accordance with Annex IV of the directive and the following standards:

Radio spectrum:	EN 300 440
EMC:	EN 301 489-1 and -3
Electrical safety:	EN 60 950

8.2 LABEL

8.3 TECHNICAL CHARACTERISTICS AND DIMENSIONS

Radio frequency
- Frequency band: 2.45 GHz
- Emitted power: 10mW
- Tag to reader data rate: 30 Kbps
- Modulation: BPSK (Biphase Shift Keying)
- Protocol: HDLC
- Number of channels: 31

Power supply
- Voltage range: 12 to 24 Volts DC
- Current: 1A max

Environmental conditions
- Relative humidity: 90% non-condensing
- Storage temperature: -25° to +80° C
- Operating temperature: -20° to +50° C

Protection class
- IP65

External dimensions
- Length: 174mm
- Width: 108mm
- Thickness: 29mm
- Weight: 0.7 kg

Connections available
- Wiegand 26bits, DATA/CLOCK (magnetic stripe ISO 7811-2), RS 232, RS 422, RS485

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